

## Chapter 10: Marine and coast

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### 10.1: Introduction

The coastline can be broadly divided into four distinguishable environments namely; inshore, offshore, terrestrial and estuarine environments.

The inshore coastal resources are those found below the high water mark and which are accessed primarily through land-based activities. These resources are diverse and can be broadly divided into estuaries, sandy beaches and rocky shores. They are highly vulnerable to human activities as they are easily accessible and are therefore subject to high levels of exploitation, primarily by recreational and subsistence users (Nicolson *et al.*, 1996). Illegal poaching of high value inshore resources and commercial harvesting also occurs within the Province. As a result the inshore resources are under heavy pressure from human activities. Approximately 25 fish species and 5 invertebrate species are targeted along sandy beaches, and the level of exploitation and stock status is variable by region within the Province (Britz *et al.*, 2001). Approximately 30 fish species are targeted along rocky shores and exploitation levels for most species is high with many species being overexploited. Eighteen invertebrate species are harvested along the rocky shores of the Province with several being overexploited (Britz *et al.*, 2001), particularly in the former homeland areas where the dependence on these resources for food is high. Seaweed is also harvested along the rocky shoreline. Estuaries are areas of high recreational activity and approximately 18 fish species and 12 invertebrate species are exploited by both recreational and subsistence fishers, with many species being over exploited.

The habitats of the offshore environment range from the warm water coastal reef areas along the Transkei Wild Coast to the cool temperate deep-waters of the Agulhas bank (Britz *et al.*, 2001). A wide range of species (including 60-70 fish species, spiny lobster and chokka squid) are exploited primarily by commercial fishers and the recreational ski boat sector (Britz *et al.*, 2001). The majority of these vessels operate south of Port Alfred, with a few commercial fishing vessels operating out of East London, Port St Johns and Coffee Bay.

The terrestrial coastal resources are considered to be within 2.5km of the high water mark, and are under the influence of the marine environment (Lubke, 2000). Due to the aesthetic nature of the coastal environment, the terrestrial resources have been subject to varying levels of urbanisation and development. Formal development has occurred primarily in the Cacadu and Amatole regions where there has been considerable urban and industrial development with the two largest cities and ports occurring in these regions. The O.R. Tambo coastal region of the province is comprised of the former homeland areas which are rural in nature. These coastal areas, however, have been subject to illegal cottage developments and uncontrolled sand mining activities due to a lack of enforcement.

Estuarine systems are highly productive systems (Turpie, 1999) which act as nursery areas for several marine species and are therefore rich in biodiversity. They are utilised by the subsistence, recreational and commercial sectors (Van Niekerk & Taljaard, 2002) and support a wide range of activities and resources. The Eastern Cape Province has the largest proportion of South Africa's estuaries (213 of the 371), which have unique assemblages of ichthyofauna as the Province is situated in the transitional zone between the warm temperate and subtropical regions (Whitfield, 1998). The western and central coastal regions of the Province are characterised by ribbon development and high levels of utilisation of these regions, while there is little or no information on many of the systems within the eastern coastal region.

In the past the management of coastal resources and implementation of policy and legislation within the Eastern Cape Province was fragmented. Several government agencies are involved in coastal management within the Province, the two main bodies being the Eastern Cape Department of Economic Affairs, Environment and Tourism (DEAET) and the Marine and Coastal Management Branch of DEAT. An important step to improve coastal management on a national level was the drafting of the White Paper for Sustainable Coastal Development (DEAT, 2000). This has led to the drafting of a Provincial Coastal Management Programme aimed at improving integrated coastal management within the provinces. The Eastern Cape Provincial Coastal Committee (PCC) has been active since early 2002, and plays a key role in bringing managers together to discuss crosscutting coastal issues and integrated coastal management, and was the first step towards improving coastal management within the Province.

## **10.2: Key Indicators**

The indicators used in this section to present the state of the marine and coastal environment were decided upon after interaction with key stakeholders. They are by no means exhaustive and aim to provide a brief indication of the current status of the marine and coastal environment and resources within the Province.

The following indicators will be covered in more detail:

- Estuarine health index;
- Catch and Total allowable catch (TAC) per fishery sector;
- Distribution and abundance of resource species;
- Pollutant loading entering the sea from land-based sources;
- Number of functional co-management initiatives; and
- Blue Flag beaches.

### **10.2.1: Estuarine health index**

The estuarine health index provides a comprehensive assessment of the condition of estuaries as it is comprised of three separate indicators, assessing the status of fish assemblages, the water quality and the aesthetics of each system. This index therefore provides a good overall assessment of the level of urbanisation and development as well as the ecosystem health.

Estuaries are among the most dynamic ecosystems supporting a diverse range of fauna and flora (Turpie, 2002) and act as nursery and feeding areas for many species of marine fish and shellfish. Due to their aesthetic appeal they are also important centres for tourism and recreation and are thus subject to heavy anthropogenic pressures. Being situated between the marine environment and river systems they are influenced by both marine pollution events and industrial and domestic effluent discharges which occur in the river catchments.

The Eastern Cape Province has a total of 213 estuaries, more than half (57%) of South Africa's estuaries. These estuaries range from large permanently open systems to small temporary open/closed systems. Several scientists and researchers have attempted to classify and estimate the health and condition of South African estuaries (e.g. Whitfield, 1992; Harrison *et al.*, 2000) with the use of various biological and physical indicators. Whitfield (2000) undertook a broad assessment of the condition and available information on individual estuarine systems within South Africa and classified the condition of each estuary based on the opinions of scientists from the different regions as well as available literature. In the State of South African Estuaries report (Harrison *et al.*, 2000) all estuaries were rated according to their condition for fish communities, water quality and aesthetics. The condition of estuarine systems within the

Province was represented as a percentage of the total number of estuaries for each of the indicators.

In order to ensure the long term sustainability of estuaries within the Eastern Cape Province the Estuarine Health Index should be used to set management goals for the protection of these resources in the future.

A summary of the condition of estuaries within the Province according to Whitfield's (2000) classification<sup>1</sup> system is provided in Table 10.1. Figure 10.1 highlights the status and condition of Eastern Cape estuaries according to Harrison *et al.* (2000).

**Table 10.1: State of estuaries within the Eastern Cape Province (Whitfield, 2000)**

State of estuaries	Number of estuaries	Percentage
No information	78	36
Fair	18	9
Good	44	21
Excellent	73	34
Total	213	100

Based on Whitfield's assessment of the condition of estuaries within the Eastern Cape Province (Table 10.1), it is evident that there is no information available on over a third (36%) of the systems. Thirty-four percent were rated as being in 'excellent' condition (in a pristine state with either no or negligible human impacts). A further 21% of the estuaries had no major anthropogenic impacts in either the estuary or catchment and are therefore regarded as being in 'good' condition. The remaining 9% of the estuaries within the Province are ranked as being in 'fair' condition, having been subject to human activities that have resulted in some degree of ecological degradation.

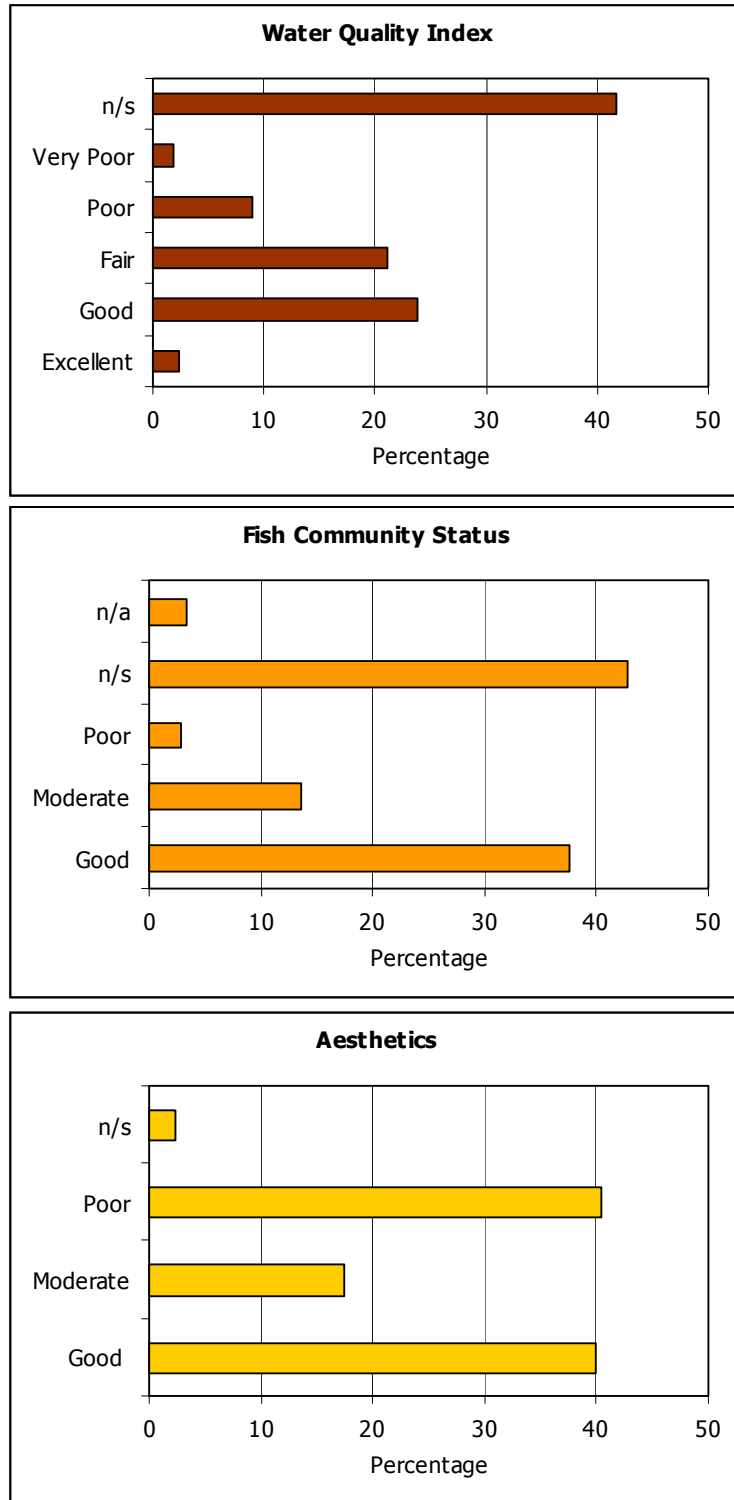
<sup>1</sup> Whitfield's Classification system used the following categories:

**Excellent** – Estuary in near pristine condition with negligible human impact

**Good** – No major negative anthropogenic influences on either the estuary or the catchment

**Fair** – Noticeable degree of ecological degradation in the catchment and/or estuary

**Poor** – Major ecological degradation arising from a combination of anthropogenic influences.



**Figure 10.1: Status and condition of Eastern Cape estuaries in terms of fish community structure, water quality and aesthetics (n/s=not sampled; n/a=not analysed) (Harrison *et al.*, 2000)**

Based on the assessment by Harrison *et al.* (2000)<sup>2</sup> presented in Figure 10.1, both the fish community and water quality indices indicate that little research has been undertaken on a large proportion of Eastern Cape estuaries. Ninety percent of the estuaries for which there is no information occur north of the Kei estuary, highlighting the need for estuarine research in this area of the Province. In terms of fish community status, only a small portion of the estuaries have a poor representation of species diversity in comparison to the potential assemblages and are thus considered to be in 'poor' condition. The actual and potential fish assemblages for the majority of estuaries, however, are similar and they are ranked as being in 'moderate' to 'excellent' condition.

Similarly only a small percentage of the estuaries within the province have 'poor' water quality as determined by the parameters measured during sampling trips. The water quality of a large portion of the estuaries sampled was rated as being 'fair' to 'excellent'.

In terms of aesthetics a significant proportion (approximately 40%) of the Province's estuaries have been subject to human-induced pressures and disturbances which has resulted in them being ranked as aesthetically 'poor' in condition. Several of these estuaries are situated in or near urban and industrial areas (e.g. Bakens, Papkuils and Swartkops in Port Elizabeth; Ngcura in the Coega Industrial Development Zone; and Buffalo in East London) and have been subject to intensive development and modification. The majority of the estuaries in the former Ciskei and Transkei homeland areas, however, are largely undeveloped and in aesthetically 'moderate' to 'good' condition.

This assessment of estuaries highlights the lack of adequate information for most systems within the Province, 114 estuaries with poor records and 78 with no records. This indicates a significant need for more research into the structure and functioning of communities and the collection of baseline information for individual systems within the Province (Coastal and Environmental Services, 2003) to ensure that they are protected and remain in good health.

### **10.2.2: Catch and Total allowable catch (TAC) per fishery sector**

The marine resources within the Eastern Cape Province are heavily exploited through subsistence, recreational and commercial activities. An indication of the abundance of these species along with the commercial catches and quota allocations provides good insight into the current status of the marine resources. Monitoring of the fisheries catches and the distribution of species can indicate where certain resources are being overexploited and where opportunities for increased harvesting exist. This indicator presents catch data where possible, and quota allocations, which were awarded to Eastern Cape-based fishing companies. Quota allocations for the chokka squid, hake long-line, inshore and offshore trawl, pelagic and spiny lobster fisheries as well as catch data for the chokka squid and line fishery are presented.

Fisheries resources and fisheries management are highly complex due to the migration paths and life histories of many of the target species, which are not confined by provincial boundaries.

<sup>2</sup> Harrison *et al.* used the following methods and classification system to rate the condition of estuaries within the province:

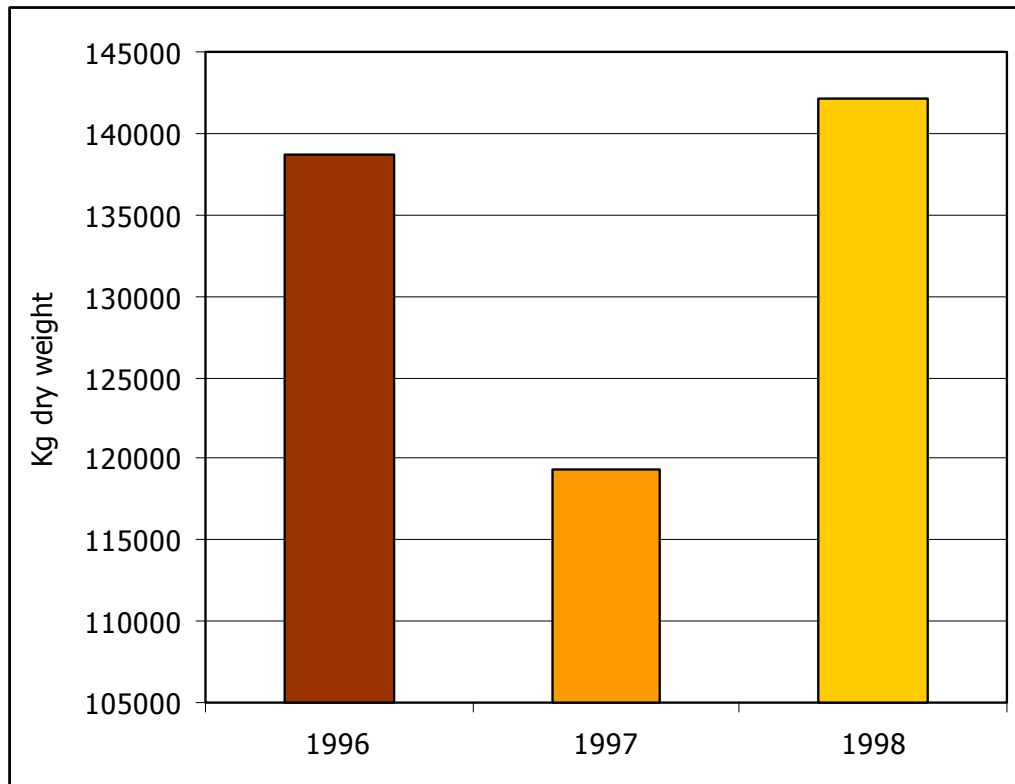
The *fish community status* was determined by calculating the similarity between the potential and actual fish assemblages within individual systems. Estuaries were ranked according to their scores which ranged from 0 (poor) to 10 (good). Six indicators were used to calculate the *water quality* index, namely: dissolved oxygen; oxygen absorbed; unionized ammonia; faecal coliforms; nitrate; nitrogen and ortho-phosphates. Using these parameters the water quality of individual systems was ranked as follows: very poor < 3; 3 < poor < 5; 5 < fair < 7; 7 < good < 9; 9 < excellent. The *aesthetic health* of each estuary was rated according to the following series of parameters; floodplain land use; shoreline status; floodplain/estuary surrounds; bridges; dams and weirs; mouth stabilisation; litter and rubble; human use; algal growth; turbidity; odour; air pollution; noise; invasive and exotic vegetation. Final index values for individual estuaries ranged between 0 and 10. Estuaries with an aesthetic rating below 6 were ranked as aesthetically poor, scores of 6-9 were rated as moderate and scores above 9 were rated as in excellent aesthetic condition. The overall aesthetics for the estuaries within the province were calculated as a percentage for each category.

While certain inshore fisheries (e.g. oysters, mussels and linefish) could possibly have some sort of regional definition, the offshore fisheries are managed and zoned nationally by the Marine and Coastal Management Branch of DEAT (Simms, *pers comm.* 2003). Total Allowable Catches (TAC) or Total Allowable Efforts (TAE) are set for the different fishery resources on a national level and not on a provincial basis. For multi-sectoral fisheries (such as the hake fishery which is comprised of inshore and offshore sectors, and hand line and long-line sectors) the TAC is apportioned between the different sectors before being allocated to individual companies or rights holders (Lesly, *pers comm.* 2003). Companies allocated quotas are not restricted by provincial boundaries and fishing companies based in the Eastern Cape can harvest their quotas outside of provincial waters. Likewise, non-Eastern Cape companies can catch their quotas within Eastern Cape waters. As a result, it is unreliable to look at catches landed in Eastern Cape ports as they may have been caught well outside of Eastern Cape waters and thus do not provide a true reflection of the status of fishery stocks within the Eastern Cape Province.

Similarly quota allocations to Eastern Cape companies do not provide a good indication of the status of the provincial fishery resources as many of the companies harvest their quotas on popular fishing grounds outside of the Eastern Cape Province, or move into and out of provincial waters as their target species migrate during different periods of the year. The quota allocations do, however, provide some insight as to the percentage of fisheries allocated to the Eastern Cape Province, and the economic benefit obtained by the Province from marine living resources. However, a change in allocation does not necessarily indicate a change in resource status, but is more likely to be influenced by socio-economic factors.

#### *Seaweed harvesting*

Seaweed is harvested from the southern Transkei to the border of the Eastern Cape Province in the west. The target species is *Gelidium sp* which is dried and exported. The harvests for the years 1996 to 1998 are presented in Figure 10.2. The current annual average harvest of seaweed in the Eastern Cape Province is optimal and represents about 70% of the standing crop in Seaweed Concession Area (SCA) number 1 (Britz *et al.*, 2001).



**Figure 10.2: Annual harvests in *Gelidium sp* in the Eastern Cape Province (Attwood, 1997; Attwood, 1998)**

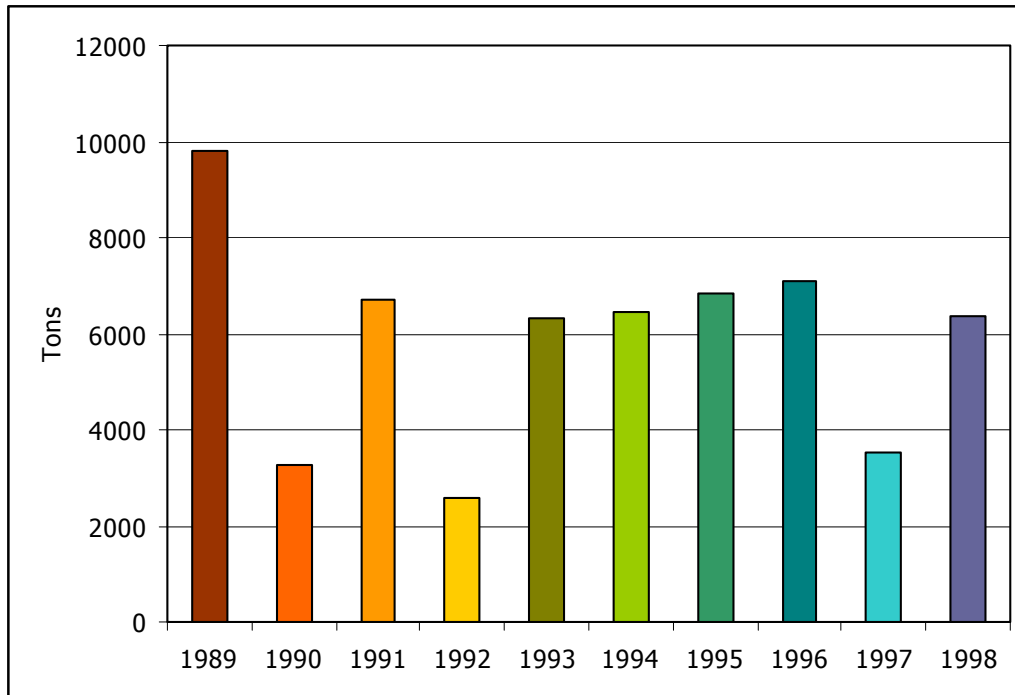
#### *Chokka squid fishery*

This fishery targets *Loligo vulgaris reynaudii* using hand lines. It is regulated by effort with the number of fishers per vessel being stipulated on a permit and is the largest single species commercial fishery in the Eastern Cape Province (Britz *et al.*, 2001).

**Table 10.2: Chokka squid fishery allocations in the Eastern Cape Province (1999/2000 season) (Britz *et al.*, 2001)**

	No. of fishing vessels 1999/2000	No. of companies 1999/2000	Vessel TAE (No. of fishers) 1999/2000
Total SA	144	107	1 585
Total EC	124	70	1 369
% EC	86%	65%	86%

Within the South African chokka squid industry the majority of the fishing vessels (86%) and companies (65%) are registered within the Eastern Cape, resulting in the majority of the total allowable effort (86%) being allocated to the Eastern Cape Province (see Table 10.2). This further highlights the importance of this fishery to the coastal areas of the Province.



**Figure 10.3: Annual catches in the Eastern Cape chokka squid fishery (Britz *et al.*, 2001)**

As illustrated in Figure 10.3, catches in the chokka squid fishery peaked at approximately 10 000 tons in 1989 after which there was a considerable decline. Catches have since stabilised at around 6 000 tons between 1993 and 1998, with only a slight decline in 1997. Currently the chokka squid stocks are perceived to be in a good condition (Sauer, *pers comm.* 2003)

#### *Hake long-line fishery*

This is a relatively new fishery in South Africa with the first experimental quotas being allocated in 1996. In 1998 the first rights (totaling 5 000 tons) were allocated between the west and east coast fisheries which target different species of hake, namely *Merluccius paradoxus* and *Merluccius capensis* respectively. Only about 6 long-line vessels operating out of Port Elizabeth and Mossel Bay are fishing in the Eastern Cape Province (Britz *et al.*, 2001). Kingklip is caught as a bycatch of this fishery, and is limited to 15% of the hake TAC. Table 10.3 summarises the hake long-line quota allocations for the 2000 to 2002 seasons.

**Table 10.3: Hake long-line quota allocations to Eastern Cape-based fishing companies (Jones, 2002)**

	2002	2001	2000
Total SA	9825	5691	10000
Total EC	1785	1297	1200
% EC	18%	23%	12%

#### *Inshore trawl fishery*

This fishing sector is relatively small in the Eastern Cape Province and catches include both deep water and shallow water hake, *Merluccius paradoxus* and *Merluccius capensis* respectively. In the Eastern Cape Province three companies were awarded quotas for hake and sole for both the

1998 (Britz *et al.*, 2001) and 2002 (Jones, 2002) seasons, while two companies were awarded mackerel quotas for both seasons (Jones, 2002). All companies operated out of Port Elizabeth (see Table 10.4). This sector targets hake, east coast sole and horse mackerel. Valuable bycatch species such as kingklip, monkfish, chokka, horse mackerel, mackerel, gurnard, Cape dory and panga are also caught (Britz *et al.*, 2001).

**Table 10.4: Inshore trawl fishery quota allocations in the Eastern Cape Province (1998 and 2002 season) (Britz *et al.*, 2001; Jones, 2002)**

	Hake (tons)		Sole (tons)		Horse mackerels (tons)	
	1998	2002	1998	2002	1998	2002
Total SA	9 438.7	9 665	872	784.8	22 000	28 350
Total EC	668.26	728	35.9	40.4	1720.4	2 568
% EC	7%	7.5%	4.1%	5.1%	7.8%	9%

#### *Pelagic fishery*

The pelagic fishery targets anchovy and pilchards, and the quotas for these resources are divided into pilchard, anchovy, Bait A and Bait B quotas. During the 1998 fishing season 17 Eastern Cape companies received quotas for the pelagic resources. A summary of the quota allocations for the 1998 season is shown in Table 10.5.

**Table 10.5: Pelagic fishery quota allocations in South Africa and the Eastern Cape Province (1998 season) (Britz *et al.*, 2001)**

	Anchovy (tons)	Pilchard (tons)	Bait A (tons)	Bait B (tons)
Total SA	98 003	95 329	3 984	8 373
Total EC	11 179	11 274	1 280	839
% EC	11.4%	11.8%	32.1%	10%

#### *South coast rock lobster*

In the Eastern Cape Province rock lobster is caught south of the Great Fish estuary using lobster pots. Boats operate out of Port Alfred, Port Elizabeth and Cape St Francis, with the most important fishing grounds being St Francis Bay (55%), Algoa Bay (21%), Agulhas Bank (15%) and Port Alfred (8%) (Britz *et al.*, 2001). A summary of the quota allocations is presented in Table 10.6 below. Landed catch in 2001/2002 totaled 290 tons tail mass, of which 40% was off-loaded in Port Elizabeth (Groeneveld, *pers comm.* 2003).

**Table 10.6: South coast rock lobster quota allocations to Eastern Cape-based companies (Jones, 2002)**

	1999/2000	2001/2002
Total SA	377 000	340 000
Total EC	123 906	115 240
% EC	33%	34%

#### *Commercial line fishery*

Both the recreational and commercial line fisheries exploit the same resources. Bag limits, size limits, closed seasons and marine protected areas are used to manage the line fishery. These fishery resources are heavily exploited and the catches have continued to decrease, with many

species populations having collapsed (e.g. kob, geelbeck, seventy-four, red steenbras) (Britz *et al.*, 2001). The number of South African commercial licenses issued for targeting these resources is to be reduced significantly to approximately a third of the existing licenses. In 2000 the majority of commercial line fishery boats operated south of Port Alfred (515) with few operating out of East London (30) and along the former Transkei area. The reported commercial catch landings for the line fishery are presented in Table 10.7. Plettenberg Bay is included with Eastern Cape landings as many vessels target species within Eastern Cape waters.

**Table 10.7: Reported commercial linefish catches (1998 and 1999 season) (Jones, 2002)**

Landing place	Snook		Yellowtail		Kabeljou		Geelbek		Carpenter		Mackerel		Sharks		Panga		Hake		Slinger		Other	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Plettenberg Bay	3.5	2.5	1.7	1.4	25	20.6	89.2	55.1	36.1	32.8	27.6	4.2	4.4	3.6	9.5	4.47	897	1 016			50	126
Jeffrey's Bay	0.11	0	0.06	0.05	25.1	10.3	18	19	17.7	42.5	1	7.1	1	0.78	4.3	3.33	128.5	125.7			15.8	51.57
Port Elizabeth	0.2	0	27.5	18.1	53	34.7	38.5	47	90.1	54.2	17.3	11.1	1.4	4.3	21	14	99.3	234.36			60.7	68.43
Port Alfred		0		0.24	84	87	47	38.5	40.8	31.3		0.1		0.7	37.5	49	9	9.9			43.6	24
East London		0	0.04	0.03	5.6	2.1	14	1.6	22	20.8		0.4		0	7.8	9.9	3.2	0.07			8.7	13.43
Transkei Coast				-		0	0.3	0.32		-		0		-		-		-	0.4	0.45	6.1	6
Total EC	3.8	2.5	30.3	19.8	192.7	154.7	207.0	161.5	206.7	181.6	45.9	22.9	6.8	9.4	80.1	80.7	1137.0	370.0	0.4	0.5	184.9	289.4
Total SA	7771.1	8361.2	559.7	320.4	650.9	501.2	699.8	455.6	516.3	561.8	132.6	117.1	300.9	322.7	97.1	91.5	2130.5	2974.6	148.8	148.9	717.0	760.1
% EC	0.0	0.0	5.4	6.2	29.6	30.9	29.6	35.5	40.0	32.3	34.6	19.6	2.3	2.9	82.5	88.2	53.4	12.4	0.3	0.3	25.8	38.1

The catch data required to calculate the provincial catch and TAC indicator is not readily available from the Marine and Coastal Management Branch of DEAT as many vessels fish on fishing grounds outside of provincial waters but land their catches in Eastern Cape ports. Although the vessel log books do record the fishing locations this data is not always recorded with landed catch, and it is difficult to determine the proportion of the catch caught between the different fishing grounds when a vessel has been at sea for a long period of time. Britz *et al.* (2001) provides a good overview of Eastern Cape fisheries but it is a once off study and is therefore not a good source of information for calculating this indicator. In order to calculate the quota allocated to Eastern Cape based fishing companies the Fishing Industry Handbook was used (Jones, 2002). This book provides the quota allocation information per company for each resource. The quotas allocated to all companies registered in the Province were used as the provincial total regardless of the areas the company vessels fish in. This suggests that provincial quota allocations are not necessarily a good indication of the status of the marine resources within the Eastern Cape Province as they are influenced by socio-economic factors as well as the stock status of resources which are assessed on a national basis due to the complex life histories of the species.

### **10.2.3: Distribution and abundance of resource species**

This indicator aims to illustrate the distribution and abundance of key resource species within the Eastern Cape Province. The distribution and abundance of resource species is a key indicator for monitoring the change of stocks over time as a result of exploitation, and represents an important tool for fisheries management. However, many fisheries stocks are dispersed across provincial boundaries and migrate between different areas of the South African coastline during their life cycles and as a result are assessed on a national level rather than on a provincial basis. Stock abundance is usually directly related to the fishing industry and history of the fishery. Based on the distribution and abundance of resources, fishing restrictions can be implemented to protect species which are showing a decline in stock abundance, while effort may be increased on other resources.

The distribution and abundance of only two fishery resources, pelagic and demersal stocks, was available for the National State of the Environment Report (DEAT, 1999) from Marine and Coastal Management. This information is not readily available on a provincial scale and as a result the national stock status is presented in Figures 10.4 and 10.5 with the non-Eastern Cape areas obscured (Naidoo & Verheye, 2001). This only serves to illustrate the proportions of the national stocks which occur within Eastern Cape waters.

#### *Seaweeds*

Seaweed harvesting occurs along the Eastern Cape coast from Southern Transkei to the western border on the Groot Wes estuary in the Seaweed Concession Area number 1. *Gelidium* species are the main species targeted and of the 450km concession area only 135km of the area provides suitable substrate. The harvest over the last few years suggests that this resource is currently exploited maximally (Britz *et al.*, 2001).

#### *Mussels*

Mussels and oysters are harvested along the entire length of the Eastern Cape coastline predominantly by subsistence fishers in the former homeland areas as well as by recreational fishers. Within the former Transkei area mussel stocks have been heavily exploited, particularly in those areas where hotels and backpackers have created a demand and established markets for the local communities harvesting the resources (Calvo-Ugarteburu, *pers comm.* 2003)

### *Abalone*

A survey of the Transkei abalone stocks was undertaken in 1994. Dives were made between Kononqaba and Mzamba and no abalone were found north of the Mbashe river (Fielding *et al.*, 1994). Mean density of abalone was 0.17 abalone per square metre, but ranged from 0.08 to 0.44 abalone per square metre (Fielding *et al.*, 1994). The variability in density reflects the presence of preferred microhabitats within a reef area (Wood, 1993). There is no commercial abalone fishery within the Eastern Cape Province, although subsistence abalone permits were issued to communities in the Hamburg area. Currently the abalone resources within the Province are heavily exploited by illegal poaching activities due to the high value on the export market. This resource is in urgent need of a stock assessment and increased enforcement of the existing legislation in order to curb illegal harvesting activities.

### *Squid*

*Loligo vulgaris reynaudii* is the most abundant squid in South African waters and supports an important fishery between Plettenberg Bay and Port Elizabeth. The majority of the total effort for the fishery is concentrated in the Eastern Cape Province and the stock status is currently perceived to be in good condition (Sauer, *pers comm.* 2003).

### *Crustaceans*

The south coast rock lobster (*Palinurus gilchristi*) is the only crustacean resource which is harvested commercially within the Province. In the Eastern Cape the south coast rock lobster occurs approximately 2-50km from the coast between Mossel Bay and East London (Groeneveld, *pers comm.* 2003). Stocks of this resource are also found on the Agulhas Bank. Within the Province fishing effort is concentrated south of the Great Fish estuary using lobster pots. The abundance of this resource, including both the inshore and offshore stocks, has shown a steady decline from 1988 to the 1999/2000 fishing season although slight increases in abundance were measured in 2000/2001 (Groeneveld, *pers comm.* 2003). The cumulative decline in the resource over the 1988-2001/2002 period is approximately 59% (Groeneveld, *pers comm.* 2003). The allocated TAC for this resource dropped by about 15% between 1994 and 1998, but it has not made an impact on the rate of stock decline (Britz *et al.*, 2001). A further reduction in the south coast spiny lobster is imminent and the scope for further development is not feasible (Britz *et al.*, 2001).

### *Pelagic*

Pilchard and anchovy are the two main species targeted by the pelagic fishery. These are national stocks which undergo considerable migrations during their breeding cycle. An indication of the abundance of these resources is shown in Figure 10.4 from a national survey undertaken in 2000.

### *Demersal*

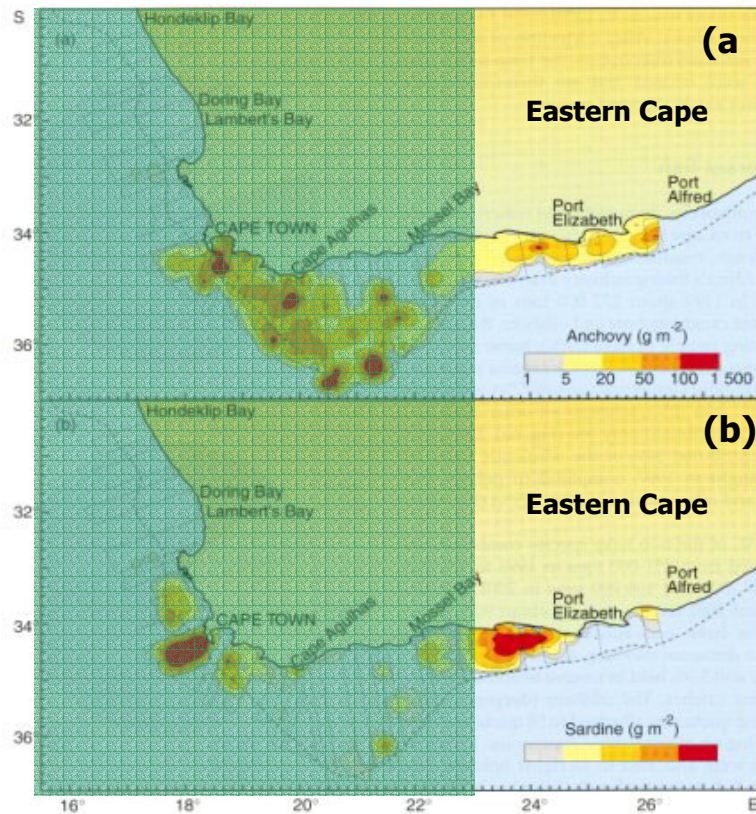
Hake, sole and horse mackerel are the main demersal species targeted by the inshore trawl sector. The bulk of the biomass of these species occurs on the west and south coasts with only a small portion occurring in Eastern Cape waters. Figure 10.5 indicates the portion of stocks which occur in Eastern Cape waters.

### *Linefish*

The general perception of the Eastern Cape linefish resource is that it has been exhausted (Britz *et al.*, 2001). There is no province-specific information for the status of the linefish resource but it is well known that many of South Africa's line fish stocks, which also occur in the Eastern Cape, have collapsed (Britz *et al.*, 2001).

Of approximately 100 species presented in the South African Marine Linefish Reports (Mann, 2000), 2% were closed<sup>3</sup> to commercial and recreational exploitation, 10% were protected and 14% were classed as critical (DEAT, 1999). However, 42% were categorised as exploitable.

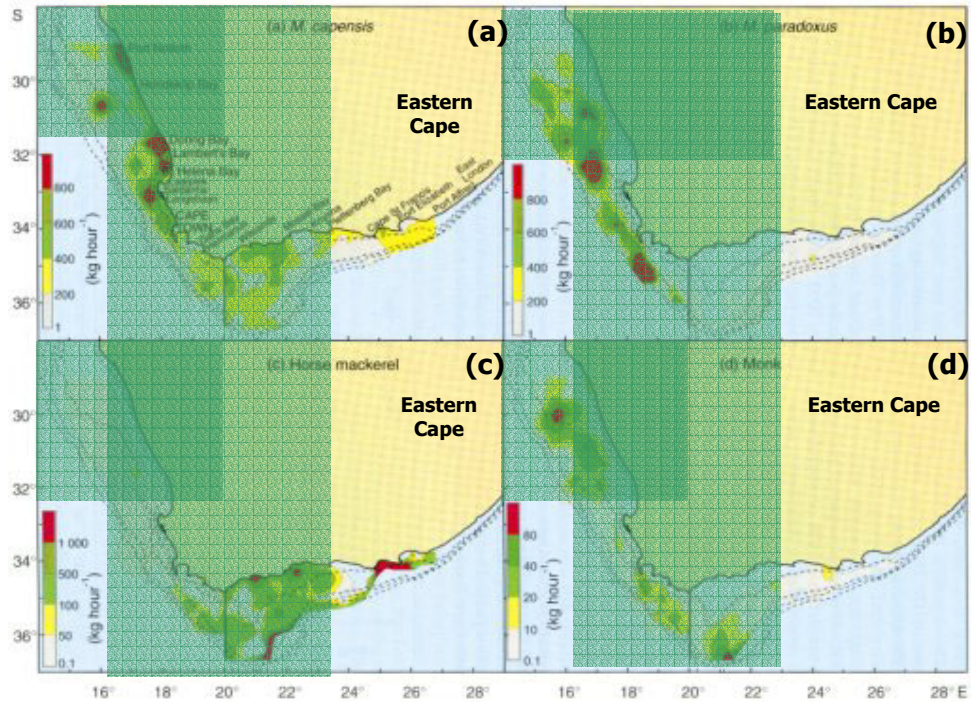
Linefish species associated with reefs in the Eastern Cape Province are heavily exploited and due to their residential and territorial nature and slow growth rates, they are susceptible to over exploitation. The stock status of most of these species is considered to be highly vulnerable (Britz *et al.*, 2001). Several species found over sandy/muddy substrates are also highly vulnerable and heavily exploited. These include species such as geelbek and the silver kob, and it appears that both stocks have collapsed in the Eastern Cape Province and are currently less than 10% of the pristine biomass (Britz *et al.*, 2001). A summary of marine linefish stocks is provided in Table 10.8.



**Figure 10.4: Distribution and relative abundance of (a) anchovy and (b) sardine (or pilchard) in November 2000 (Naidoo & Verheye, 2001)**

<sup>3</sup> The linefish categories have the following bag limits per day:

Closed – No fish may be taken; Restricted – No fish may be taken; Critical – Two fish per person per day



**Figure 10.5: Biomass distribution of (a) shallow-water hake, (b) deep-water hake, (c) horse mackerel and (d) monk from January 2000 and May 2000 research surveys (Naidoo & Verheye, 2001)**

**Table 10.8: Summary of the popular marine linefish stock status (Britz *et al.*, 2001)**

Species	Life history	Stock status
Silver Kob	Resident	Collapsed
Dusky Kob	Coastal migrant and resident	Collapsed
Squaretail kob	Resident	Collapsed
Geelbek	Coastal migrant	Collapsed
Dageraad	Resident	Collapsed
Seventy-four	Coastal migrant	Collapsed
Slinger	Resident	Collapsed
Red Steenbras	Resident	Collapsed
White steenbras	Coastal migrant	Collapsed
Yellow belly rockcod	Resident	Collapsed
Catface rockcod	Resident	Collapsed
Red stumpnose	Resident	Collapsed
Red roman	Resident	Collapsed
Scotsman	Resident	Collapsed
Engilsman	Resident	Collapsed
Poenskop	Resident	Collapsed
White mussel cracker	Resident	Collapsed
Bronze bream	Resident	Unknown
Galjoen	Resident	Collapsed
Santer	Resident	Unknown
White stumpnose	Resident	Under review
Carpenter	Resident	Under review
Hottentot	Resident	Under review
Zebra	Resident	Unknown

Blacktail	Resident	Under review
Spotted grunter	Resident	Under review
Strepie	Coastal migrant	Under exploited
Elf	Coastal migrant	Over exploited
Leervis	Coastal migrant	Unknown
Snoek	Nomadic	Under review
Yellowtail	Nomadic	Optimally exploited
King mackerel	Coastal migrant	Over exploited
Queen mackerel	Coastal migrant	Optimally exploited
Panga		Under exploited
Hake		Optimally exploited
Longfin tuna		Optimally exploited

#### 10.2.4: Pollutant loading entering the sea from land-based sources

Industrial and domestic effluents are generated in the developed areas within the Province and are ultimately discharged into the coastal environment where they can have significant impacts on the health of the inshore environment. Monitoring of the number of discharges within the Province and the nature and volume of the effluent is important for future reference and can be used as an indication of the expansion of industrial activities and growth of domestic services. This information must be used to control future licensing of point source discharges. This indicator illustrates the location, nature and volume of the domestic and industrial effluent discharges in the marine and estuarine environments within the Eastern Cape Province.

Currently there are seven registered domestic marine discharge points (Table 10.9) within the Eastern Cape and 5 industrial effluent discharge points (Table 10.10). The domestic discharge effluent for all sites is monitored, either by DWAF or the local municipality, while private companies are responsible for monitoring their industrial effluent and reporting to DWAF. A further permit has been granted for the construction of an offshore pipeline at Hood Point on the West Bank at East London, although this has not been constructed yet. Where available, monitoring data for the effluent discharged are presented in Appendix 1 and 2.

There are many storm water outlets into the marine and estuarine environments within the Province that are maintained by the local municipalities. A list of the major outlets is provided in Table 10.11. Due to the irregular discharges from these outlets there is no water quality monitoring data for these discharge points.

The medians and 95th percentiles of the water quality variables collected during monitoring indicates that conductivity, ammonia, chemical oxygen demand, suspended solids, cadmium, chromium, lead and zinc were often above the DWAF general limits (DWAF, 1999). Although the monitoring data collected is for the effluent discharge and does not include data for the marine environment surrounding the discharge point, it was compared to the target values for the coastal zone (DWAF, 1995) which fall well below the general limits. In addition to those water quality parameters which are above the general standards, pH, copper and nickel were outside the DWAF water quality guidelines for coastal and marine waters.

Problems, which may result from discharges of poor water quality into the marine environment, include increased mortalities, eutrophication and excessive algal growth, as well as changes in growth rates and reproduction of resident marine species. Table 10.12 indicates the potential problems associated with each water quality variable. The water quality criteria for the various water use sectors can be obtained from Kempster, Hattingh and van Vliet (1980).

**Table 10.9: Domestic discharges into the coastal environment in the Eastern Cape Province (Lucas, *pers comm.* 2004; Retief, *pers comm.* 2003; Kaleni, *pers comm.* 2003). Available monitoring data for the discharges are presented in Appendix 2.**

<b>Name</b>	<b>Location</b>	<b>Description of discharge</b>	<b>Monitoring responsibility</b>	<b>Estimated daily discharge</b>	<b>Permitted annual discharge</b>
Humansdorp Sewage Treatment Works	Seekoei estuary		DWAF		Not to exceed 2 000m <sup>3</sup> /day
Fish Water Flats Water Treatment Works	Sea discharge 2m behind breakers at Deal Party PE	Treated to general standards	DWAF	39.65Ml/day	Domestic - 32 120 000 m <sup>3</sup> /annum
Cape Receive Nelson Mandela Metro Sewage	Sea discharge at Cape Receive	Treated to general standards	DWAF	10.31Ml/day	3 412 800 m <sup>3</sup> /annum
Drift Sands Sewage Treatment Works	Sea discharge at Cape Receive	Treated to general standards	DWAF	11.30Ml/day	No permitted discharge volume. Plant capable of treating 2 410 000m <sup>3</sup> /annum
Hood Point	East London, surf zone	Temporary discharge of raw sewage with screening only	Buffalo City Municipality	7Ml/day	
East Bank Water Treatment Works	East London, surf zone behind breakers	Treated to general standards	Buffalo City Municipality	40 Ml/day (?)	
Gonubie Sewage treatment works	Clako Stream	Treated to general standards	Buffalo City Municipality	5 Ml/day	

**Table 10.10: Industrial effluent discharges into the marine and estuarine environments in the Eastern Cape Province (Lucas, pers comm. 2004; Fourie, pers comm. 2004; Retief, pers comm. 2003). Available monitoring data for the discharges are presented in Appendix 3.**

Name	Location	Description of discharge	Monitoring responsibility	Current daily discharge	Permitted annual discharge
Osterlig Visery	Port Elizabeth harbour	Cooling sea water	?	?	?
Pretoria Portland Cement (PPC)	Papenkuils Canal tidal areas, Port Elizabeth	Saline water/gypsum (?)	?	?	?
Fish Water Flats Water Treatment Works	Papenkuils Canal	Industrial effluent	DWAF	31.47Ml/day	12 840 Ml/annum
Albany Coastal Water Board Ndlambe municipality	Bushmans estuary	Brine discharge	DWAF (once only)	500m3/day	No permit available
DowAgro Sciences	ex Cyril Lord pipeline at Hood Point, surfzone	Saline effluent	DowAgro Sciences Currently negotiating with municipality to discharge into Hood Point	150m3/day	200 m3/day

**Table 10.11: Significant storm water discharges into the marine and estuarine environments in the Eastern Cape Province. Volumes and monitoring data unavailable (Lucas, *pers comm.* 2004)**

Name	Location
Summerstrand	Port Elizabeth
Humewood	Port Elizabeth
Central	Port Elizabeth
Bakens River to PE Harbour	Port Elizabeth
Papenskuil Canal	Port Elizabeth
Deal Party	Port Elizabeth
Motherwell Canal	Zwartkops Estuary
Markman Canal	Zwartkops Estuary
Chatty River	Zwartkops Estuary
First Creek	Buffalo Estuary, East London
Second Creek	Buffalo Estuary, East London
Esplenade	East London
Moore Street Drain	East London
Eastern beach	East London
Blind River	Eastern beach, East London
Ihlanze stream	Nahoon beach, East London
Gonubie Point	East London

**Table 10.12: Potential problems associated with various elevated water quality parameters (DWAF, 1995)**

Natural Environment	Marine Organisms	Recreational Use
<b>pH</b>		
Important in the natural environment as it affects solubility of metals, in which case can lead to toxic releases particularly when low	General growth deficiencies Changes in respiration patterns Changes in water pumping rates Shell deformation Increased mortalities	Skin and eye irritations
<b>Ammonia</b>		
Free ammonia highly toxic to aquatic life, affected by pH, mainly from sewerage and agricultural runoff <sup>4</sup>	General growth deficiencies Increased mortalities	
<b>Suspended solids</b>		
Unpleasant aesthetics	General growth deficiencies Increased mortalities	Physical injuries Unpleasant aesthetics (odour) Clogging/blockage of equipment
<b>Nitrate</b>		
Eutrophication Decrease in oxygen levels	General growth deficiencies Increased mortalities	
<b>Nitrite</b>		
Eutrophication Decrease in oxygen levels	General growth deficiencies Increased mortalities	
<b>Phosphorous</b>		
Eutrophication Decrease in oxygen levels	Possible increased mortalities	
<b>Cadmium</b>		
Cumulative and highly toxic to higher forms, industrial pollution associated	General growth deficiencies Lowered reproduction	Cumulative and highly toxic to higher forms, industrial

with zinc and lead <sup>4</sup>	Changes in respiration patterns Changes in water pumping rates Mortalities Burrowing abnormalities	pollution associated with zinc and lead <sup>4</sup>
<b>Chromium</b>		
	Increased mortalities	Essential in human nutrition without which insulin doesn't function, however toxic in high concentration. Metal plating and tanning industries are potential pollutants. <sup>4</sup>
<b>Copper</b>		
Toxicity to fish exacerbated by low calcium content and a low conductivity. <sup>4</sup>	General growth deficiencies Lowered reproduction Changes in respiration patterns Changes in water pumping rates Mortalities Burrowing abnormalities	
<b>Nickel</b>		
Essential element but toxic to certain plants as high concentrations <sup>4</sup>	Increased mortalities	
<b>Lead</b>		
	General growth deficiencies Lowered reproduction Increased mortality	Main source is burning of fossil fuels, affects nerve tissues, more toxic at low calcium concentrations. <sup>4</sup>
<b>Zinc</b>		
Toxicity to fish exacerbated by low calcium content and a low conductivity. <sup>4</sup>	General growth deficiencies Lowered reproduction Changes in respiration patterns Changes in water pumping rates Mortalities Burrowing abnormalities	
<b>Faecal coliforms</b>		
		Gastrointestinal problems Skin, Eye, respiratory irritations

### 10.2.5: Number of functional co-management initiatives

New policy and legislation advocates a change in resource management to co-operative and co-management agreements in order to encourage local stakeholders to take responsibility for the natural resources as well as assist poorly resourced government departments in management functions. An assessment of the number and effectiveness of co-management initiatives within the Province will indicate the successfulness of co-management projects which have been initiated over the long term.

This indicator aims to represent the level of public, private and community involvement in planning and management in the coastal zone through co-management initiatives. The National Environmental Management Act (RSA, 1998) provides the overarching legislative framework for environmental governance in South Africa. It has provisions for the establishment of partnerships and cooperation agreements for the management of natural resources and provides the legal framework for formalizing co-management agreements (Hauck & Sowman, 2003).

<sup>4</sup> Adapted from Kempster, Hatting and van Vliet (1980)

In the Eastern Cape several co-management projects have been initiated and are in various stages of implementation. Very few of these projects have been formalised in terms of the legislation and currently exist as local forums which are involved in resource management. The Eastern Cape Estuaries Management Programme established co-management initiatives on 5 estuaries which now range from informal to formalised co-management initiatives. A list of the existing and coastal co-management agreements within the Province is provided in Table 10.13.

**Table 10.13: Location, type and status of co-management initiatives within the Eastern Cape Province**

Name	Location	Type	Status	Source
Amadiba Adventures initiative	Between Mzamba and Mtentu estuaries	Tourism (Horse and hiking trail, fishing guides)	In process of formalising agreement	Quatekana, pers comm. 2003 Ngubane, pers comm. 2003
Mtentu Estuary Management Forum	Mtentu Estuary	Natural Resource Management	Formal agreement in terms of NEMA Constitution and Management Plan in Place	Ndovela, pers comm. 2003
Mbizana Conservation Development Initiative		Tourism and resource management	No formal agreement signed yet	Huggins, pers comm. 2003
Quakeni Conservation Development Initiative		Tourism and resource management	No formal agreement signed yet	Huggins, pers comm. 2003
Nqabarha Community Projects	Willowvale	Arts & crafts, Medicinal plant garden, woodlots	Draft constitution has been prepared but are still negotiating a formal agreement	Ncisane, pers comm. 2003
Estuary Care	Bushmans & Kariega Estuary	Estuarine management	No formal agreement	Fox, pers comm. 2003
Manteku Estuary	Manteku estuary	Estuarine and resource management along with eco-tourism	In the process of establishing a formal agreement, to be finalised during 2004	Sihlophen, pers comm. 2003
Mngazana Conservation Programme	Mngazana Estuary	Primarily mangrove conservation, initiating canoe trails and tourism projects	Awaiting two signatures on constitution for formal agreement in terms of NEMA	Msimang, pers comm. 2003
Operation Jody	Western Region	Law enforcement and compliance	Contract in terms of MLRA between SAPS and MCM	Dlulani, pers comm. 2003
Dwesa/Cwebe initiative	Dwesa/Cwebe	Participatory Forestry Management agreement	Formal agreement in terms of the National Forest Act	Pienaar, pers comm. 2003
Mkambati initiative	Mkambati	Contractual park arrangement	Will be implemented under the Eastern Cape Environmental Conservation Act	Pienaar, pers comm. 2003

The majority of these co-management initiatives are in the early stages of development and operation and continued monitoring in the future will determine their success.

### 10.2.6: Blue Flag beaches

Blue Flag status indicates that beaches are in near pristine condition and have excellent amenities available for public use. Monitoring the number of beaches within the Province which attain this status will indicate the success of coastal managers in maintaining their beaches in good condition and ensuring adequate services for the public as well as acting as a surrogate for water quality and pollution (Blue Flag Campaign, 2003).

This indicator reports on the number of beaches in the Eastern Cape Province obtaining Blue Flag status per year. This represents the condition of the major beaches in terms of environmental education and information, water quality, environmental management, and safety and services, which includes excellent life saving standards, top rate ablution and parking facilities as well as access for the disabled.

South Africa is currently one of 24 countries participating in the Blue Flag campaign and our beaches are assessed according to 14 criteria and are subject to a strict monitoring process. The criteria are summarised in Table 10.14. Before they can attain Blue Flag status, each beach must undergo a pilot phase during which they have two years to meet the various criteria. If they fail to meet these standards within this timeframe then they may only reapply for pilot phase after a one-year period. The Wildlife and Environment Society of South Africa (WESSA) are the national Blue Flag coordinators for DEAT and are responsible for monitoring the pilot phase beaches and recommend their approval to the international jury.

**Table 10.14: Criteria for assessing beaches for Blue Flag status (Blue Flag Campaign, 2003)**

Category	Criteria
Management	Blue Flag Administration
	Management of beach activities
	Provision of ablution facilities
	Cleaning of beach
Water quality	Compliance with recreational bathing water quality
	Management of storm water pollution
	Compliance with National Oil Pollution Contingency Plans
	Compliance with planning legislation
Safety	Provision of lifeguards on beach
	Infrastructure required
	Patrolling of beach area
Information and education	Display and maintenance of notice board
	Undertaking environmental education projects
	Monitoring of beach area

Eight South African beaches were awarded Blue Flag status for the 2003/4 season spanning from 1 November 2002 to 30 April 2003, and a further six have registered and are beginning pilot projects to achieve full Blue Flag status in the near future.

In the Eastern Cape Province, Humewood Beach in the Nelson Mandela Metropolitan Municipality is the only beach to have received Blue Flag status so far (Kelly, *pers comm.* 2003). Humewood was initially awarded pilot phase Blue Flag status during the 2000/2001 season and has since been awarded full status for the 2001/2002, 2002/2003 and

2003/2004 seasons (each season begins on 1 November and runs until 30 April the following year) (Cain, *pers comm.* 2003). Humewood Beach is situated on the outskirts of the main city area of Port Elizabeth and has good facilities and its own Environmental Education division. A further three beaches in the Eastern Cape Province namely, Dolphin Beach in Jeffrey's Bay, Wells Estate near Port Elizabeth and Kelly's beach in Port Alfred are currently running pilot phase projects and aim to achieve full Blue Flag status in the near future (see Table 10.15).

**Table 10.15: Number and status of Blue Flag beaches in the Eastern Cape Province (Kelly, *pers comm.* 2003; Cain, *pers comm.* 2003)**

Beach Name	Location	Status	Season
Humewood Beach	Port Elizabeth	Full Blue Flag Status	2001/2002; 2002/2003; 2003/2004
Dolphin Beach	Jeffrey's Bay	Pilot Phase	2003/2004
Wells Estate	Port Elizabeth	Pilot Phase	2003/2004
Kelly's Beach	Port Alfred	Pilot Phase	2003/2004

### **10.3: The state of the marine and coastal environment in the Eastern Cape Province**

The Eastern Cape Province marine and coastal environment is an extremely valuable asset and resource due to its aesthetic value, ecological and biological diversity and economic potential (Coastal and Environmental Services, 2003). The Province's coastline is over 820km in length, extending from the Groot Wes estuary in the south to the Umtamvuna estuary in the north (Coastal and Environmental Services, 2004a). The marine and coastal environment includes the terrestrial ecosystems (dune systems, coastal forests and grasslands), which are influenced by the marine environment, as well as the intertidal and inshore habitats and the deepwater offshore environments. These habitats host a wide range of biological diversity and resources, which have been subject to varying levels of exploitation and development in the past. High levels of infrastructural development have occurred between the Kei and Kromme estuaries, which has resulted in increased pollution, and loss of visual appeal of the natural coastal environment in this region of the Province. Inshore marine resources are also heavily exploited within the Province, particularly north of the Kei estuary, where the rural subsistence life style is prominent in the former homeland areas. The offshore resources are less accessible to the subsistence fishermen but are heavily exploited by commercial operators and fishermen who have the necessary equipment.

In the past the marine and coastal environment was managed sectorally on a resource basis. This led to an overlap in the areas of jurisdiction and uncertainty as to the roles and responsibilities between the different organs of state. A new approach to coastal management has recently been outlined in new national policies, which advocate an integrated and co-ordinated approach to management of coastal resources (DEAT, 2000). This requires that the marine and coastal resources are managed holistically and that a coastal management programme is established for the Province. The Marine and Coastal Management Branch of the national Department of Environmental Affairs and Tourism (DEAT) and the provincial Department of Economic Affairs, Environment and Tourism are the lead agents for coastal management within the Province. Currently there is a lack of institutional capacity and coordination between these departments to administer and enforce the existing coastal legislation, which has allowed uncontrolled utilisation and development in several areas of the Eastern Cape coastline (Coastal and Environmental Services, 2004b).